

Altitude Compensating Nozzle Design Tool, Phase I

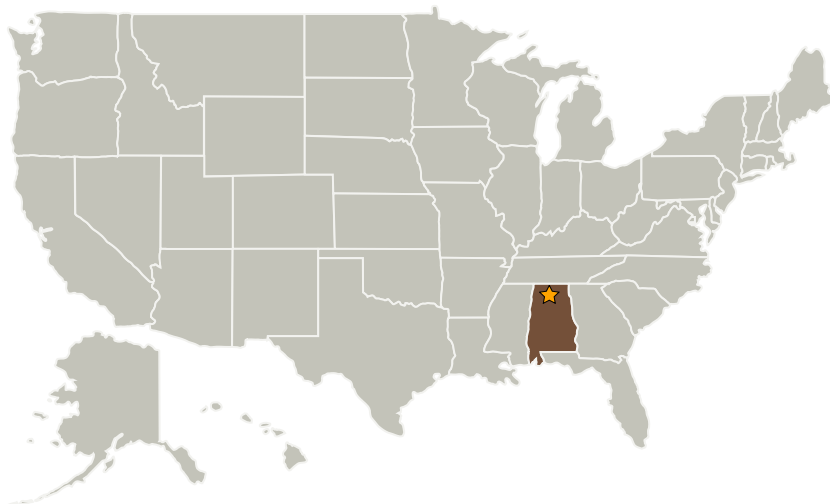
Completed Technology Project (2004 - 2004)



Project Introduction

Launch vehicle subsystem preliminary design tools that are fast, accurate, and seamlessly integrated into an electronic design and optimization environment have become an essential part of the preliminary design process. A Phase I study is proposed to significantly enhance the capabilities of the existing Aerospike Design and Performance Tool (ADAPT) computer code for use in the design and analysis of launch vehicle concepts employing altitude-compensating nozzles. Proposed Phase I enhancements include: 1) provisions to enable the analysis of user defined nozzle geometry, 2) consideration of base pressure with and without base bleed in the performance calculations, 3) methods to accommodate user defined combustion device and nozzle efficiencies, and 4) methods to estimate potential side (control) forces resulting from asymmetric throttling of individual thrusters on an aerospike, plug, or plug-cluster engine. The proposed Phase I enhancements fit within a broader and more comprehensive Phase I-II plan. Future (Phase II) enhancements will include: 1) extension of the design and analysis methodology to other altitude compensating nozzle types, 2) modification of ADAPT allowing it to be used as an analysis module within a broader multidisciplinary optimization (MDO) framework, and 3) a web-based user interface.

Primary U.S. Work Locations and Key Partners



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Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Organizational Responsibility	1
Project Management	2
Technology Areas	2

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Marshall Space Flight Center (MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
K T Engineering Corporation	Supporting Organization	Industry	Madison, Alabama

Primary U.S. Work Locations

Alabama

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Joseph Szedula

Technology Areas

Primary:

- TX15 Flight Vehicle Systems
 - └ TX15.1 Aerosciences
 - └ TX15.1.3 Aeroelasticity